

8/5/93  
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August 5, 1993

**VIA HAND DELIVERY**

Wayde Hartwick  
Project Manager  
Waste Management Division  
U.S. EPA  
77 West Jackson - CS-3T  
Chicago, Illinois 60604

**Re: Revised Statement of Work  
American Chemical Services, Inc.  
NPL Site - Griffith, Indiana**

Dear Mr. Hartwick:

Attached is a revised copy of the Statement of Work (SOW) for the Remedial Design/Remedial Action at the ACS Site. We revised the document based on the agreements reached during our recent negotiating sessions. Please note that at your request, we have gone back to most of the original U.S. EPA language in the SOW. Our changes include the additional language we believe is necessary to define the actual Scope of Work to be conducted and clarify the expectations of U.S. EPA and IDEM.

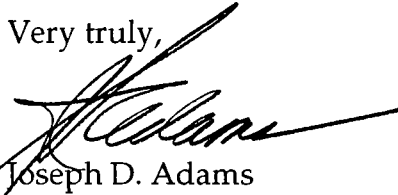
Letter to Mr. Hartwick

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08/05/93

We hope that this revised document will facilitate Agency review and continuing discussions. If you have any questions, please give me a call at (708)691-5020.

Very truly,

A handwritten signature in black ink, appearing to read "J. Adams", with a long horizontal flourish extending to the right.

Joseph D. Adams

JDA:sam

enclosure - August 5, 1993 Revision of SOW

cc: Gabrielle Hauer w/enclosure - via U.S. mail

Steve Siegel/Steve Mason w/enclosure - via hand delivery

Greg Sukys w/enclosure - via U.S. mail



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF RESEARCH AND DEVELOPMENT  
RISK REDUCTION ENGINEERING LABORATORY  
CINCINNATI, OHIO 45288

**DRAFT**

REPLY TO:  
Releases Control Branch  
U. S. EPA  
Building 10 (MS-104)  
2890 Woodbridge Avenue  
Edison, New Jersey 08837-3679

DATE: July 8, 1993

SUBJECT: Comments on "Extended Bioventing Treatability Study on Soils from the American Chemical Services Site, Griffith, Indiana" Conducted by Envirogen, Inc. of Lawrenceville, New Jersey

FROM: Chien T. Chen *Chien T. Chen*  
Environmental Scientist, Releases Technology Section, RCB  
Superfund Technology Demonstration Division

TO: Joan Mattox  
Physical Scientist, Technical Support Branch  
Superfund Technology Demonstration Division

At the request of Michael Gruenfeld, I have reviewed the report entitled, "Soil Vapor Extraction Treatability Study (Eighteen Week Results), American Chemical Services NPL Site" submitted by Envirogen, Inc. on June 15, 1993. Following is a list of my comments:

- o In Gene F. Bowlen's letter of June 24, 1993, he stated, "The extent of removal attributable to either mechanism is difficult to quantify .....", this is not true. According to Envirogen's report of April 1993, the quantity of each compound removed by SVE can be calculated by the addition of the amounts of the compound in the off-gas and that adsorbed in the carbon tube.

- o Although in bioventing, the air flow and power needed per unit time are lower than those of the regular SVE, the time needed for the removal of VOCs is longer. Therefore the total operating costs have to be estimated before one can know which technique is lower. However, as I mentioned in my comments of May 13, 1993, efforts should be concentrated on the efficiency of bioventing on the removal of SVOCs.

It is encouraging that the bioventing technique can reduce most of the SVOCs to such low concentrations. However, as mentioned in my previous comments (May 13, 1993), the reaction by-products should be studied to ensure that no hazardous materials are produced.

**FAX TRANSMITTAL**

OPTIONAL FORM NO. 10 (7-89)

To: Wayde Hartwick Steve Siegel

From: RCB

Subject: 3-5541

Transmitted: 7/8/93

Pages: 4

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as previously stated, in my review of the 6 week results, I have stated that SVE is an ideal process to remediate this site. FSVE and Bioventing may reduce all site contaminants to below residential levels on detection limits. LTTT is an ideal process to remediate this site. FSVE and Bioventing may reduce contamination levels for the VOCs and SVOCs.

\* Do the 18 week results make sense? Were they conducted using standard bioventing practices? Are the results consistent with the 6 week study? Have ground water monitoring been performed?

add in cont

OR IS NOT WORKING?

May 7, How certain can it be technology, not model established? see next page.

How SVOC contamination? LTTT can remove SVOCs?

**DRAFT**

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- o All of the compounds of concern, including the cPAHs, in which the analytical detection limits are greater than the remediation levels should be listed. These compounds can be analyzed to much lower detection limits by eliminating the signals of other compounds in a GC/MS analysis (The Environmental Monitoring Systems Laboratory of EPA in Cincinnati may be able to do this work).
- o Since the laboratory experiments of the 18 week study were only conducted on the nutrient amended soil, it is not known how long it will take to reach the remediation goal or to what extent the contaminants can be removed in a reasonable period of time if the experiments are conducted on non-amended soil. However, from the results of the 6 week study, it may take a very long time, or it may never reach the remediation goal. Therefore, the difficulty and cost of the addition of nutrients to the contaminated soils in the subsurface should be taken into consideration before the implementation of the bioventing system.
- o Tables 1 and 2 showed that the detection limits of most of the compounds were very high in the initial study column (Time Zero and 6 weeks). It can not be determined from those numbers whether the concentration of each compound decreased between Time Zero and 18 weeks. It would be better if the exact concentrations were listed in every column. If those concentrations were not obtained, the solutions should be diluted to obtain lower detection limits.

In response to Wayne Hartwick's letter of June 29, 1993, some enhancement procedures for SVE are described as follows:

In-situ steam stripping and injection of hot air into the subsurface have been used to speed up the remediation of VOCs with some success. However, for the remediation of the SVOCs at this site, I don't think that those two techniques can have any benefit, because most SVOCs have higher boiling points than the temperature of steam or hot air used in these two techniques. In-situ ozonation has been used in Germany (see attached figure) for the treatment of gasoline contaminated sites, but the results are not known. Pilot scale experiments have reduced PAHs from 2,300 mg/kg to 50 mg/kg in 20 days. In the USA, laboratory scale studies have shown that this technique can reduce a few PAHs to very low concentrations. In-situ ozonation and bioventing have the similar results: in-situ destruction of organic compounds. However, the time for remediation is much shorter for in-situ ozonation than bioventing, but the former technique may have higher operation costs. It should be emphasized that neither of those two technologies is well established.

If you have any questions, please call me at (908) 906-6985.

Attachment

cc: Anthony N. Tarant  
Michael Gruenfeld

- No mention of LTT

and covered  
immediately

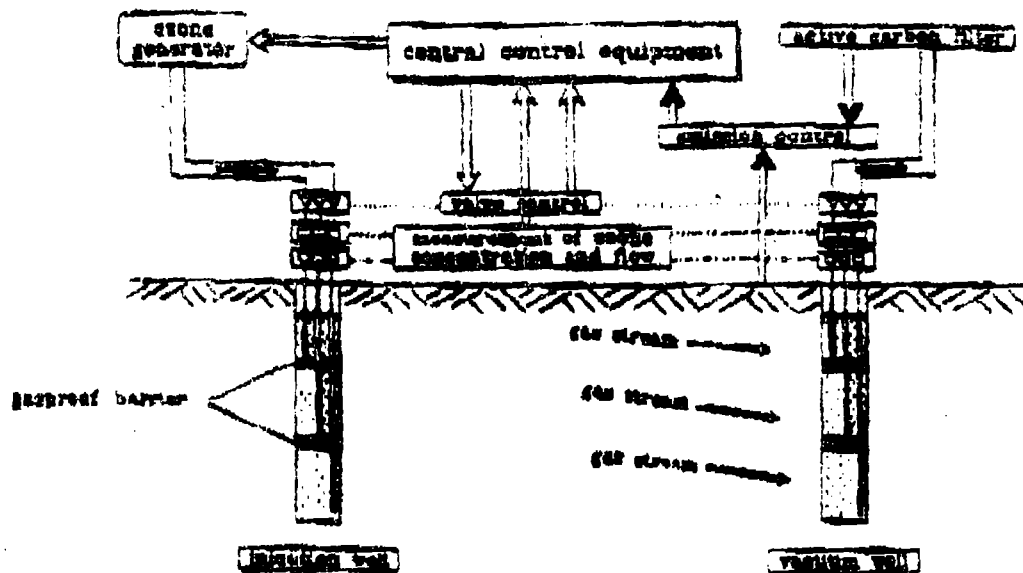
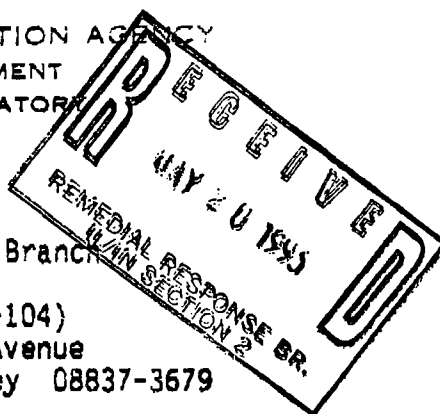


fig 3: In-situ-treatment, flow diagram



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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REPLY TO:  
Releases Control Branch  
U. S. EPA  
Building 10 (MS-104)  
2890 Woodbridge Avenue  
Edison, New Jersey 08837-3679

DATE: May 13, 1993

SUBJECT: Comments on Treatability Studies for Remediation of Contaminated  
Soils and Waste, American Chemical Services Site, Griffith, Indiana

FROM: Chien T. Chen *Chien T. Chen*  
Environmental Scientist, Releases Technology Section, RCB  
Superfund Technology Demonstration Division

TO: Joan Mattox  
Physical Scientist, Technical Support Branch  
Superfund Technology Demonstration Division

James L. Yezzi provided me the following documents and asked me to review them:

1. Mark S. Rothas' 4/8/93 letter to Wayde M. Hartwick
2. Your 4/15/93 Facsimile Cover Sheet to Mike Gruenfeld
3. Wayde M. Hartwick's 4/19/93 memo to you
4. Wayde M. Hartwick's 4/19/93 letter to Mike Gruenfeld
5. Declaration for the Record of Decision for the subject site
6. Canonic Environmental's "Bench Scale Treatability Study, SoilTech Anaerobic Thermal Process, American Chemical Services NPL Site, Griffith, Indiana"
7. Vapex Environmental's "Bench Scale Vapor Extraction Treatability Study at American Chemical Services NPL Site, Griffith, Indiana"
8. Envirogen's "Soil Vapor Extraction Treatability Study, American Chemical Services NPL Site"

I have reviewed these documents and my comments are listed as follows:

(A) For "Low Temperature Thermal Treatment (LTTT)":

- o The results from the bench scale studies had demonstrated that this technology could reduce all the contaminated constituents



including VOC, SVOC, PAH and PCB in both the soil and buried waste to below the remediation goal or the detection limit.

- o The use of "Anaerobic Thermal Process" (air depleted) for the thermal treatment is a good idea, because it can avoid the accidental ignition and incineration.
- o In the bench scale studies, the "preheat zone" process was not tested. In the future study, it should be conducted, because this zone is not anaerobic. At a temperature of 600°F, some of the VOCs still have the possibility to ignite and cause vigorous burning because the concentration of the contaminants was so high. It may be better to deplete the oxygen (air) in this process.
- o The temperature at "Retort Zone" is so high (1000 to 1100°F), many compounds may decompose rather than desorb (e.g.: SoilTech found that PCB was destroyed in a site remediation, see pg. 10 of Doc. 6). Since the concentration of the contaminant at this site is so high, the possibility of sudden decomposition and pressure increase should be considered. Also, the decomposition products should be identified to understand their hazardous properties.
- o The residence time in the bench scale "Retort Test" was 30 minutes. It was proved to be sufficient. However, it should be re-evaluated in large scale remediation, otherwise the residuals which would be sent to the combustion zone may contain enough hazardous materials for concern.
- o Pg. 22 of Doc. 6, Section 3.2: Please explain why the coked solids were not analyzed for oil and grease.
- o Table 7 of Doc. 6: Can't the extracting solution be concentrated so that the detection limit can be lowered to the remediation level? I think that it is possible especially for the three compounds: hexachlorobutadiene, hexachlorobenzene and bis (2- ethylhexyl) phthalate, because they have high boiling points.
- o Pg. 24 of Doc. 6, paragraph 4: Some of the PCB may have decomposed, not "complete desorption" according to the SoilTech's experience mentioned above.
- o According to Table 3 of Doc. 6, the detection limit of PCB was 1000 ppb, but on page A6, it was stated, "Results from the PCB analysis indicated that the PCB concentration for each of the source samples was below 100 ppb." Please explain how it was figured.

- o As expected, all the VOCs, but not SVOCs can be removed to below the remediation goal or the detection limit.
- o Since the test sample did not contain some of the compounds or contain less than those detected during the RI, the efficiency of SVE from the treatability studies may be very different from the full scale remediation.
- o Although PCB is not expected to be removed by SVE alone, the accompanying biodegradation during SVE may destroy small quantity of PCB. Therefore, it is worthwhile to spike the test sample with PCB if any further treatability test will be conducted.
- o Due to the heterogeneities of the soil matrices in the subsurface and the possible obstruction during the mass transfer, the total numbers of pore volume required to remediate the site will be much higher than that obtained in the column test which was conducted at optimum conditions.
- o Since the site has great amount of water, many water soluble contaminants may dissolve in subsurface water. SVE is known to be less effective for the removal of compounds dissolved in water. Hence water soluble compounds such as ketones may be difficult to remove by SVE.
- o Carbon dioxide should be analyzed in the "soil vapor discharge" to verify whether any mineralization (from biodegradation) occurred during the SVE experiments.
- o Pg. 6 of Doc. 7, line 2-3: The post-test soil should be obtained as composites of the whole column instead of only the top and bottom of the soil column.
- o Pg. 9 of Doc. 7, paragraph 2: Since the VOCs were not collected continuously, the calculated total VOCs may not be accurate.
- o Pg. 15 of Doc. 7: Since the remediation of cPAH (carcinogenic polyaromatic hydrocarbon) is of concern, they should be spiked



to over the detection limits to examine the capability of SVE remediation of those compounds.

- o Pg. 18 of Doc. 7: The concentration of SVOCs in the column 3 test should be analyzed to see how effective SVE for the remediation of OSCA (Off-Site Containment Area) soils.
- o Pg. 24 of Doc. 7, Full Scale Design Parameters: In addition to the pore volume exchange rate, the radius of influence of the wells will also affect the well spacing. Because the heterogeneities of the soil matrix at the site can be different from place to place.
- o Tables 1, 2 and 3 of Doc. 7: The calculation of initial concentration using the "soil vapor discharge" may not be accurate, because biodegradation may have happened during SVE. Many entries in the tables showed that the concentrations calculated by soil analysis were higher than those calculated by "soil vapor discharge."

#### (C) Bioventing

- o The conducting time (6 weeks) for the bioventing column test was too short for the evaluation of its efficiency.
- o VOCs have been proven to be efficiently removed by SVE without any enhancement, therefore bioventing should be concentrated on SVOCs, because they were not efficiently removed by un-enhanced SVE.
- o In addition to the initial contaminants, carbon dioxide in the off-gas should be analyzed to see any enhanced mineralization occurred during the bioventing experiments.
- o The possible by-products should be identified and analyzed to see whether any hazardous materials<sup>is</sup> produced.
- o Pg. 9 of Doc. 8, paragraph 3: If GC-MS was used to analyze the compounds, even vinyl chloride and chloromethane eluted as part of the air peak, their mass spectra are very different from that of air, therefore, their quantities still can be estimated.
- o Pg. 12 of Doc. 8, paragraph 5: It can not be assumed that short chain fatty acids had formed from the slight decline in pH value of the soil. Fatty acids should be analyzed to verify this assumption.
- o Pg. 20 of Doc. 8: Some compounds were detected in the gas stream but not in the soil. Those compounds may be the products of biodegradation. Some compounds that were found in the soil but not in the vapor phase. This was assumed to be due to

biodegradation. If it is possible, the products from these reactions should be identified.

- o Pg. 32 of Doc. 8: For an accurate analysis, the 0.02 N  $H_2SO_4$  should be standardized after the preparation and an acid-base indicator solution should be used to indicate the end point instead of using a pH meter.
- o Pg. 37 of Doc. 8, 6a: According to the described procedure, the total volume will be greater than one liter and no dilution can be done. It is recommended to dissolve the boric acid in 900 milliliters before the dilution.
- o Appendix B of Doc. 8: The unit of the time in all the tables should be stated, e.g.: hour, day etc.

#### RECOMMENDATIONS

1. The LTTT process showed very good efficiencies for the removal of all VOCs, SVOCs and PCB. If no incineration or sudden decomposition to increase the pressure occurs, it should be an ideal process to remediate this site. However, the possible emission of hazardous waste during the excavation of the soils should be controlled to avoid the health hazard to the on site workers and the nearby residents. If no suitable and cost effective emission control procedure can be used, SVE can be used to remove the VOCs before the excavation is started.
2. SVE alone can not remove PCB, cPAH, water soluble materials and a lot of SVOCs. Since this site contains those materials, SVE is not suitable for the remediation of this site.
3. If time is not a decision factor, more experiments should be conducted on this technology. Because the testing results showed that some SVOCs were reduced considerably although not to below the remediation goal. For a longer period of time, using the optimum conditions and suitable nutrients and microorganisms, this technology may mineralize all the contaminants. It is very probable that bioventing will be less expensive than LTTT.

cc: James L. Yezzi  
Michael Gruenfeld  
Anthony N. Tafuri